Emissions Inventory Help Sheet for Bakeries

What do I need to report?

Bakeries need to report air pollution emissions from the burning of fuels in ovens and boilers, as well as from the production of baked yeast products, which emit ethanol, a **volatile organic compound** (**VOC**). VOC emitted from baking should be reported on *Evaporative Process Forms*. Fuel-burning processes such as natural gas ovens, boilers and water heaters, need to be reported on *General Process Forms*. Burning fuel emits CO, NO_x, PM_{10}, SO_x, and VOC. See the "Instructions for Reporting 1999 Annual Air Pollution Emissions" for more information and examples of completed forms.

How do I fill out the Evaporative Process and General Process Forms?

- For bakery products, use a separate Evaporative Process Form for each oven which bakes yeast products. List each yeast product baked in that oven on its own line as a "Material Type" and give each a Process ID number. If Process IDs are not pre-printed on your forms, assign a different Process ID number for each material type.
- For natural gas consumption, use one General Process Form for each category of equipment rating in use: "< (less than) 10,000,000 Btu/hr" or "10–100,000,000 Btu/hr."
- "Process Type/Description" should include basic process information such as:
  Example for an Evaporative Process Form: "Bread products baked in oven #1."
  Example for a General Process Form: "2 Ovens and 1 boiler, each <10,000,000 Btu/hr."
- Tier Codes: for the Evaporative Form use 070103 (food products, bakeries).
  for the General Form use 020301 (industrial external fuel combustion, natural gas).
- On the Evaporative Form, "Material Type" (column 9) is the yeast product name, formula or recipe name as reported on the Baked Yeast Products Emission Factor (EF) Calculation Form, which accompanies this Help Sheet. On the General Form, "Emissions based on" (line 9) is the name of the fuel used, which is typically natural gas.

How do I determine the emission factors (EF) for my baked yeast products?

The EF is the number that converts pounds of yeast product baked to pounds of pollutant (VOC) emitted. See the Baked Yeast Products Emission Factor Calculation Form on the reverse for complete instructions. Attach this form or a spreadsheet equivalent to your report.

To calculate emissions from baking: Report in column 10 of the Evaporative Process Form the number of pounds of each yeast product that was baked during the year. Then multiply the number of pounds of product by the emission factor, and enter the result in column 16.

How do I determine the emission factors for my natural gas oven or boiler?

The table below shows the SCC Codes and emission factors for the most common external combustion equipment, which includes ovens, boilers and hot water heaters. The figures below assume that only natural gas is used. If you use another fuel, please call (602) 506-6790 for more information.

Natural Gas		Pollutant and Emission Factor (in lbs/MMCF)					
Equipment Rating	**SCC**	**CO**	**NOx**	**PM10**	**SOx**	**VOC**	**Lead**
10–100 MM Btu/Hr	10200602	84	100	7.6	0.6	5.5	.0005
<10 MM Btu/Hr	10200603	84	100	7.6	0.6	5.5	(na)

To calculate emissions from natural gas ovens and boilers: On the General Process Form, report on line 11 the total number of natural gas therms used during the report year. Write the word "therms" on line 12. Show the conversion factor of **0.0000952** on line 13, to convert therms to million cubic feet (MMCF). In the table, write each pollutant on its own line in column 14 and its emission factor in column 15. Write the unit "lb/MMCF" in column 16. Calculate emissions of each pollutant by multiplying the number of therms times the conversion factor by the pollutant emission factor, and enter the result in column 24. A detailed example can be seen in the "Emissions Inventory Example for Natural Gas Boilers and Other Heating Equipment."

Baked Yeast Products Emission Factor (EF) Calculation Form

Include a copy of this completed form with your emissions inventory. Make additional copies of this form as necessary.

Business Name _____ Year _____ Permit Number # _____

Provide a unique product name for each product in column (A).

Column (F) = VOC emission factor (*pounds of ethanol emitted per pound of bread produced*).

VOC EF = [0.95(B) + 0.195(C) – 0.51(D) – 0.86(E) + 1.90] / 2000 When no final yeast is added, the VOC EF = [0.95(B) + 0.195(C) + 1.90] / 2000

Example: VOC EF = [(0.95 × 2.4% initial yeast) + (0.195 × 3 total hrs) – (0.51 × 1% spike yeast) – (0.86 × 1.2 spike hrs) + 1.90] / 2000
= [2.28 + 0.585 – 0.51 – 1.032 + 1.9] / 2000
= [3.223] / 2000
= 0.0016115, rounded to 0.00161 pounds of VOC per pound of bread produced

Reference: U.S. EPA's *Alternative Control Technology Document for Bakery Oven Emissions*, EPA 453/R-92-017.

YEAST-LEAVENED PRODUCTS ONLY (A) Product, Formula or Recipe Name Show as "Material Type" in column 9 of Evaporative Process Form	(B) INITIAL YEAST AS PERCENT OF FLOUR (nearest 1/10th of a percent)	(C) TOTAL FERMENT TIME (IN HOURS) (begins with first mixing of yeast with water, nearest 1/10th of an hour)	(D) YEAST SPIKE AS PERCENT OF FLOUR (nearest 1/10th of a percent)	(E) SPIKE TIME (IN HOURS) (nearest 1/10th of an hour)	(F) **VOC EMISSION FACTOR** (LB/LB) (see formula above) Enter in column 12 of Evaporative Process Form